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EXAMINER	
ROSENBERGER, RICHARD A	
ART UNIT	PAPER NUMBER
2877	

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Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary	Application No.	Applicant(s)	
	10/090,316	BORDEN ET AL.	
	Examiner	Art Unit	
	Richard A Rosenberger	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspond nc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-22 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-22 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

1. Claim 2-6, 8 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 2, "the predetermined frequency" has no antecedent basis and no connection to the structure of claim 1.

In claim 7, "said predetermined frequency" has no antecedent basis.

In claim 8, "said second beam" has no antecedent basis or connection to the structure of claims 1 and 7, from which it depends.

In claim 11, "the second beam" has no antecedent basis.

In clam 12, "the predetermined frequency" has no antecedent basis.

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-3, 5, 6, 9, 13, 14 and 19-22 are rejected under 35 U.S.C. 102(b) as being anticipated by Rosencwaig et al (US 4,636,088).

As to claim 1, Rosencwaig et al shows a method for determining a property of a portion of a structure having a first layer; see the discussion of layers in column 4, line s 50-61, column 6, lines 45, and elsewhere. The reference teaches generating a first beam (34) of electromagnetic radiation (column 6, lines 20-24), focusing the beam onto a region of a first layer (column 6, lines 32-33); as the beam is focussed on the sample and the sample may include a top layer, it is necessarily true that the beam is focused onto a region of the first layer. The reference measures a temperature change in the surface of the sample (column 7, lines 3-5 and column 8, lines 1-4). The reference uses a relationship between temperature change and an electrical conductive property (dopant level; see column 10, lines 1-21).

As to claim 2 (as understood), the modulation frequency is inherently less than some "maximum frequency"; the claim gives no definite definition of the claimed "maximum frequency", thus it can be any frequency that is grater than the "predetermined frequency". It would be trivial to find some formula which relates any selected "maximum frequency" to any number, including a radius of the second beam.

As to claim 3 (as understood), the reference teaches that the modulation frequency can be in the range of 50 kHz (column 6, line 19), which is smaller than a maximum frequency of approximately 100 kHz.

In claim 6, the reference teaches comparing the measure reflectance with a predetermined value (column 9, lines 49-55).

As to claim 5, the reference teaches that the modulation frequency can be selected to be in the range of 50 kHz (column 6, line 19); The instant disclosure teaches that the modulation frequency in the instant invention can be as much a 100 kHz (page 23, line 3). If the 100 kHz of the instant disclosure meets the limitation of claim 5, then the 50 kHz of the reference surely also does.

As to claim 9, the reference discusses moving the sample to measure different regions of the sample (see column 6, lines 8-12).

As to claim 12, the reference does not discuss frequency of modulation of the first beam in terms of the transfer of heat by diffusion. However, the reference does disclose that the frequency is low, disclosing that it is "preferably greater than 50 kHz". The instant disclosure gives values of the frequency used in the invention as 0.1 kHz to 100 kHz (page 23, line 3). Thus the teaching of the reference includes having the frequency in a range of 50 kHz to 100kHz, which, according to the instant specification, meets the claimed condition. If a frequency of 50 kHz to 100 kHz meets the claimed condition for applicant, it will inherently meet it for the reference.

As to claims 13 and 14, all layers are at least to some degree optically absorbing; and it is the absorption of the pump beam 34 that causes the heating of the sample in the reference.

As to claim 19, the reference shows an apparatus with a first source (30) of a beam (34) of photons modulated (by modulator 32) at some frequency. There is a second source (50) which produces a second beam (52) has a low power that does not significantly heat the sample. There is a photosensitive element (detector 56) in the path of the second beam (52) after it has reflected from the sample. The second beam, upon reflection, is modulated by the changing reflectivity at the frequency of the first beam (column 4, lines 5-9). The reference does not discuss frequency of modulation of the first beam in terms of the transfer of heat by diffusion; see the discussion as to claim 12 above, which shows that the teaching of the reference includes having the frequency in a range of 50 kHz to 100kHz, which, according to the instant specification, meets the claimed condition

As to claim 20, the reference discloses a processor (58) which does such operations and adding (column 8, lines 53-54) and comparing (claim 7), and "may be programmed" (column 9, line 49-50); as these are computational steps, the processor is a computer. It compares (claim 7) the beam to a known standard, which comparison includes determining if the reflected power is greater than some predetermined power from the standard.

As to claim 21, the reference focusses (claim 5) a beam (52) onto a layer being tested, and measured the reflectance of the beam from the sample. The sample may have a layer thereon; see above. The reflectance is correlated to a previously

determined value from a previous reflectance measurement from a reference wafer (column 9, lines 49-55; claim 7).

As to claim 22, the sample is moved to make a plurality of measurements along a line (column 6, line 9; column 9, lines 62 and 64-65).

5. Claims 4, 7-8, 10, 11, and 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosencwaig et al (US 4,636,088).

See above for a discussion of the Rosencwaig et al reference.

In claims 4 and 10, using the measurements to control a manufacturing process would have been obvious; for example, measuring the dopant concentration (column 3, lines 34-40), discovering that it is incorrect, and not adjusting the process would foolish.

In claim 7; the use of any known circuitry for detecting the modulated reflected beam, such as a well-known lock-in amplifier, would have been obvious because these are known arrangements for detecting such modulated signals.

In claim 8, the reference teaches using a dichroic mirror which will reflect the second beam but not the first (column 6, lines 35-38 and column 7, lines 24-28). The use of other known means to separate the reflected first and second beams, such as filters, would have been obvious because they are known means for accomplishing the purpose being pursued in the reference.

As to claim 11, the reference teaches that the second beam be selected to not significantly heat the sample; choosing the second beam to provide less than 10% of the heating in within the general scope of the teachings of the reference, and would have been obvious.

As to claims 15-18; it would have been obvious to use the method of the reference with any type of material used in the semiconductor manufacture to which the reference is in general directed; the reference does not teach or suggest any criticality in the type of material with which the method of the reference may be used.

6. Claim 5 is further rejected under 35 U.S.C. 103(a) as being unpatentable over Rosencwaig et al (US 4,636,088) as applied to claim 2 above, and further in view of Rosencwaig (US 4,513,384).

At the bottom of column 5, a variation of the claimed formula is given, differing only be algebraic manipulation and the use of angular frequency ω rather than frequency f. As the Rosencwaig et al ('088) reference teaches that the frequency of the modulation of the pump beam (34) be selected to produce modulation of the detected probe beam 52 (note column 4, lines 7-13; if the reflected beam were not modulated, then the "narrow bandpass filters" of line 10 would render the device inoperative), it is at least obvious that the frequency be selected so that this will happen, that the frequency not be so high that the periodic changes

in the reflectivity not occur because the heat from the pump beam does not have time to diffuse away from the heated area between periods of high intensity. Thus any operative system must meet the claimed limitation, and, as the formula is known, those in the art would recognize that this is the case.

7. Papers related to this application may be submitted to Group 2800 by facsimile transmission. The faxing of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The fax number is (703) 308-7722.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to R. A. Rosenberger whose telephone number is (703) 308-4804.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0956.

R. A. Rosenberger
24 July 2003

Richard A. Rosenberger
Primary Examiner